

### REMARKS

The status of the claims is as follows. Claims 1-74 were originally filed and were subject to restriction and to election of species. As required by the Restriction Requirement, Applicant elected the invention of Group I, Claims 1-32 and 49-62 and further elected species A, which the Office Action has indicated is readable apparently on only Claims 1-6. Claims 7-74 were withdrawn from consideration in the Office Action. Claims 33-48 and 63-74 were previously canceled and Claims 7-32 and 49-62 have been canceled herein. Claims 1-5 have been amended herein and Claims 75-94 have been added.

#### The Amendment

Claim 1 was amended to recite that the saturated cyclic compounds of part (b)(i) are selected from the group consisting of oxygen substituted cyclic compounds and cyclic compounds comprising more than one ring. Support therefor is in the Specification, for example, page 10, lines 22-24, and page 9, line 24. Claim 1 was amended in part (b)(ii) to recite benzene substituted with one or more fluoro groups. Support therefor is in the Specification, for example, page 16, Table 2. Claim 1 was also amended to delete "optionally" in part (b)(iii) and to recite that the substituted benzene is substituted with one or more fluoro groups, fluoroalkyl groups or alkoxy groups. Support therefor is in the Specification, for example, page 18, lines 5-7.

Claim 2 was amended to recite that the saturated cyclic compound comprises two rings, each having at least four atoms in the ring. Support therefor is in the Specification, for example, original claim 2.

Claim 3 was amended to correct a typographical error. Claim 3 was also amended in part (b)(ii) to recite benzene substituted with one or more fluoro groups. Support therefor is in the Specification, for example, page 16, Table 2.

Claim 4 was amended to satisfy its dependency on Claim 1 as amended.

Claim 5 was amended to satisfy its dependency on Claim 1 as amended.

Claim 75 is directed to a device according to claim 1 wherein said solid component comprises silica. Support therefor is in the Specification, for example, original claim 31.

Claim 76 is directed to an optical system comprising a device according to claim 1. Support therefor is in the Specification, for example, page 6, lines 8-9.

Claim 77 is directed to an optical system according to Claim 76 wherein the solid component comprises a cavity and an optical path comprises first and second segments separated by the cavity. Support therefor is in the Specification, for example, original claim 7.

Claim 78 is directed to an optical system according to claim 77 further comprising control means for selectively causing the liquid composition to be disposed in the cavity between the first and second segments. Support therefor is in the Specification, for example, original claim 7.

Claim 79 is directed to an optical switch comprising a device according to claim 1. Support therefor is in the Specification, for example, page 6, lines 8-9.

Claim 80 is directed to an optical switch according to claim 79 wherein the solid component comprises optical waveguides that are formed in a substrate and intersect each other and a cavity having a wall surface at a predetermined angle from the optical axis of the optical waveguide and positioned at the intersection of the optical waveguides. Support therefor is in the Specification, for example, page 7, first paragraph.

Claim 81 is directed to a device comprising a solid component and a liquid composition interfaced therewith wherein the liquid composition is a saturated cyclic compound selected from the group consisting of oxygen substituted cyclic compounds and cyclic compounds comprising more than one ring. Support therefor is in the Specification, for example, original Claim 1 and page 10, lines 22-24, and page 9, line 24.

Claim 82 is directed to a device according to claim 81 wherein the liquid composition is a saturated cyclic compound that is an alcohol or ketone. Support therefor is in the Specification, for example, page 10, line 24.

Claim 83 is directed to a device according to claim 81 wherein the liquid composition is a saturated cyclic compound comprising two rings that are fused. Support therefor is in the Specification, for example, page 9, line 24-25.

Claim 84 is directed to a device according to claim 81 wherein the liquid composition is a saturated cyclic compound comprising two rings that are spiro. Support therefor is in the Specification, for example, page 9, line 24-25.

Claim 85 is directed to a device comprising a solid component and a liquid composition interfaced therewith wherein the liquid composition is a benzene substituted with one or more fluoro groups or substituted with one or more electron-donating groups attached directly to the ring and one of more fluoro groups attached to the ring or to the electron-donating groups. Support therefor is in the Specification, for example, original claim 1 and page 16, Table 2.

Claim 86 is directed to a device according to claim 85 wherein the electron-donating groups are selected from the group consisting of alkyl, alkoxy, hydroxy, and amino. Support therefor is in the Specification, for example, original claim 3.

Claim 87 is directed to a device comprising a solid component and a liquid composition interfaced therewith wherein the liquid composition is a combination comprising one or more of benzene or substituted benzene and at least one of an alkane or substituted alkane. Support therefor is in the Specification, for example, original claim 1.

Claim 88 is directed to a device according to claim 87 wherein the weight percent of benzene or substituted benzene in the combination is about 30% to about 90%. Support therefor is in the Specification, for example, original claim 56.

Claim 89 is directed to a device according to claim 87 wherein the combination comprises benzene substituted with one or more fluoro groups or fluoroalkyl groups. Support therefor is in the Specification, for example, original claim 23.

Claim 90 is directed to a device according to claim 87 wherein the alkane is substituted with a hydroxy group, an oxo group, a keto group, or an alkoxy group. Support therefor is in the Specification, for example, original claim 26.

Claim 91 is directed to a device according to claim 87 wherein the substituted benzene is selected from the group consisting of fluorinated derivatives of benzene, toluene, xylene, ethylbenzene, diethylbenzene, propylbenzene, and dipropylbenzene. Support therefor is in the Specification, for example, original claim 28.

Claim 92 is directed to a device according to claim 91 wherein the fluorinated derivatives thereof are selected from the group consisting of fluorobenzene, difluorobenzene, trifluorobenzene, tetrafluorobenzene, pentafluorobenzene, hexafluorobenzene, fluorotoluene, difluorotoluene, trifluoromethyltoluene, tetrafluorotoluene, and pentafluorotoluene. Support therefor is in the Specification, for example, original claim 29.

Claim 93 is directed to a device according to claim 87 wherein the alkane or substituted alkane of the combination is selected from the group consisting of cyclohexane, cyclopentane, hexane, pentane, butane, propane, neopentane, methylbutane, methylpropane, methanol, ethanol, 2-propanol, 1-propanol, 2-butanol, 2-methyl-2-propanol, 2-methyl-1-propanol, acetone, butanone, cyclohexanone and cyclopentanone. Support therefor is in the Specification, for example, original claim 30.

Claim 94 is directed to a device comprising a solid component and a liquid composition interfaced therewith, the liquid composition having a refractive-index that is substantially equal to that of the solid component, the liquid composition being selected from the group consisting of liquid compositions of Table 1, liquid compositions of Table 2 and liquid compositions of Table 3. Support therefor is in the Specification, for example, Table 1, Table 2 and Table 3.

Withdrawn Rejections

Applicant acknowledges the indication in the Office Action that the rejection of Claims 1-6 over Sato, *et al.*, in view of Miyazawa, *et al.*, of record in the Office Action mailed March 2, 2004, was withdrawn in light of Applicant's previously filed comments.

Rejection under 35 U.S.C. §102

Claims 1 and 3 were rejected under paragraph (b) of the above code section as being anticipated by Attridge (U.S. Patent No. 5,166,515). Although the second sentence in this paragraph 3 of the Office Action refers to Troll, Applicant assumes that this is a typographical error and that the sentence should have recited Attridge. If Applicant's assumption is incorrect, Applicant respectfully requests the opportunity to address any rejection made in this paragraph in view of Troll.

The Office Action indicates that Attridge discloses a device comprising a solid component (waveguide) and a liquid composition interfaced therewith where the liquid composition has a refractive index that is substantially equal to that of the solid component and that the liquid composition consists of one or more of benzene or substituted benzene.

Claim 1 now recites in part (b)(iii) that the liquid composition is a combination comprising one or more of benzene or substituted benzene and at least one of an alkane or substituted alkane having a boiling point less than about 130 °C wherein the substituted benzene is substituted with one or more fluoro groups, fluoroalkyl groups or alkoxy groups. Attridge does not disclose or suggest a liquid composition having the recited combination.

Another point to be mentioned is that the Restriction Requirement included an election of species wherein it was stated that the application contained "claims directed to the following patentably distinct species of the claimed invention: a. A Device with a groove in a substrate, claims 1-6; b. An Optical System with a groove in a substrate and control means, claims 7-32; and c. An Optical Switch with a groove in a substrate and waveguides on a substrate, claims 49-62."

Therefore, by the very reasoning of the election of species, Attridge, which is directed to a waveguide, cannot anticipate Claims 1-6, where the species is a groove in a substrate, unless the election of species requirement is incorrect. The Office Action cannot have it both ways. Either the species are patentably distinct or they are not.

In light of the fact that the above rejection has apparently vitiated the rationale for the election of species requirement, Applicant has added claims directed to the species of optical

system and optical switch. If the election of species requirement is not discontinued, then claims to a device with a groove in a substrate are patentably distinct from the teaching of Attridge's waveguide because of the rationale for the election of species.

Claim 3 is directed to a device according to claim 1 wherein the liquid composition is benzene substituted with one of more fluoro groups or substituted with one or more electron-donating groups attached directly to the ring and one or more fluoro groups attached to the ring or to the electron-donating groups wherein said electron-donating groups are selected from the group consisting of alkyl, alkoxy, hydroxy, and amino. Attridge does not disclose or suggest such a liquid composition. The Office Action refers to col. 8, line 43, of Attridge. However, this cited passage concerns cylindrical structures and biosensors. Furthermore, the list of substances at col. 4, lines 13-18, does not include a substance that meets the claimed liquid composition.

For reasons similar to those discussed above, new Claims 75-94 are not disclosed or suggested by the disclosure of Attridge.

Claims 1, 3 and 5 were rejected under paragraph (b) of the above code section as being anticipated by Becker, *et al.* (U.S. Patent No. 5,382,985) (Becker).

The Office Action indicates that Becker discloses a device comprising a solid component and a liquid composition interfaced therewith where the liquid composition has a refractive index that is substantially equal to that of the solid component and that the liquid composition consists of one or more of benzene or substituted benzene and optionally at least one of an alkane or substituted alkane.

Claim 1 now recites in part (b)(iii) that the liquid composition is a combination comprising one or more of benzene or substituted benzene and at least one of an alkane or substituted alkane having a boiling point less than about 130 °C wherein the substituted benzene is substituted with one or more fluoro groups, fluoroalkyl groups or alkoxy groups. Becker does not disclose or suggest a liquid composition having the recited combination.

Furthermore, Becker does not disclose a device according to Claim 1 wherein the liquid composition is benzene substituted with one or more fluoro groups or substituted with one or more electron-donating groups attached directly to the ring and one of more fluoro groups attached to the ring or to the electron-donating groups wherein the electron-donating groups are selected from the group consisting of alkyl, alkoxy, hydroxy, and amino. The candidate liquids listed in Table II of Becker do not disclose or suggest any liquid that comprises a fluoro group, which is required in Claim 3.

Claim 5 is also not disclosed or suggested by Becker for the reasons given above with respect to Claim 1.

Furthermore, Becker's solid component comprises a plurality of waveguides wherein one such waveguide comprises an optical switch. Accordingly, as discussed above, by the very reasoning of the election of species, Becker, which is directed to a waveguide and optical switches, cannot anticipate Claims 1-6, where the species is a groove in a substrate, unless the election of species requirement is incorrect. If the election of species requirement is not discontinued, then claims to a device with a groove in a substrate are patentably distinct from the teaching of Becker's waveguide and optical system because of the rationale for the election of species.

For reasons similar to those discussed above, new Claims 75-94 are not disclosed or suggested by the disclosure of Becker.

Claims 1, 2 and 6 were rejected under paragraph (e) of the above code section as being anticipated by Fouquet, *et al.* (U.S. Patent No. 6,324,316) (Fouquet). The Office Action asserts that Fouquet discloses a device comprising a solid component (waveguide) and a liquid composition interfaced therewith where the liquid composition has a refractive index that is substantially equal to that of the solid component and that the liquid composition consists of saturated cyclic compounds consisting essentially of carbon and hydrogen and optionally oxygen.

Claim 1 now recites in part (b)(i) that the liquid composition is a saturated cyclic compound selected from the group consisting of oxygen substituted cyclic compounds and cyclic compounds comprising more than one ring. Fouquet does not disclose or suggest such compounds for the liquid composition.

Claim 2 is directed to saturated cyclic compounds comprising two rings. Fouquet does not disclose or suggest such a feature for the fluid.

Claim 6 is also not disclosed or suggested by Fouquet for the reasons given above with respect to Claim 1.

Furthermore, Fouquet's solid component comprises an optical switch and waveguides. Accordingly, as discussed above, by the very reasoning of the election of species, Fouquet, which is directed to a waveguide and optical switches, cannot anticipate Claims 1-6, where the species is a groove in a substrate, unless the election of species requirement is incorrect. If the election of species requirement is not discontinued, then claims to a device with a groove in a substrate are patentably distinct from the teaching of Fouquet's waveguide and optical system because of the rationale for the election of species.

For reasons similar to those discussed above, new Claims 75-94 are not disclosed or suggested by the disclosure of Fouquet.

Claims 1, 2 and 6 were rejected under paragraph (e) of the above code section as being anticipated by Myer, *et al.* (U.S. Patent No. 6,532,319) (Myer). The Office Action asserts that Myer discloses a device comprising a solid component (waveguide) and a liquid composition interfaced therewith where the liquid composition has a refractive index that is substantially equal to that of the solid component and that the liquid composition consists of saturated cyclic compounds consisting essentially of carbon and hydrogen and optionally oxygen.

Claim 1 now recites in part (b)(i) that the liquid composition is a saturated cyclic compound selected from the group consisting of oxygen substituted cyclic compounds and cyclic compounds comprising more than one ring. Myer does not disclose or suggest such compounds for the liquid composition.

Claim 2 is directed to saturated cyclic compounds comprising two rings. Myer does not disclose or suggest such a feature for the fluid.

Claim 6 is also not disclosed or suggested by Myer for the reasons given above with respect to Claim 1.

Furthermore, Myer's solid component comprises a photonic switching system and waveguides. Accordingly, as discussed above, by the very reasoning of the election of species, Myer, which is directed to a waveguide and optical switches, cannot anticipate Claims 1-6, where the species is a groove in a substrate, unless the election of species requirement is incorrect. If the election of species requirement is not discontinued, then claims to a device with a groove in a substrate are patentably distinct from the teaching of Myer's waveguide and optical system because of the rationale for the election of species.

For reasons similar to those discussed above, new Claims 75-94 are not disclosed or suggested by the disclosure of Myer.

Claims 1-3 were rejected under paragraph (e) of the above code section as being anticipated by Troll (U.S. Patent No. 6,377,873). The Office Action asserts that Troll discloses a device comprising a solid component (waveguide) and a liquid composition interfaced therewith where the liquid composition has a refractive index that is substantially equal to that of the solid component and that the liquid composition consists of saturated cyclic compounds consisting essentially of carbon and hydrogen and optionally oxygen and one or more benzene or substituted benzene.

Claim 1 now recites in part (b)(i) that the liquid composition is a saturated cyclic compound selected from the group consisting of oxygen substituted cyclic compounds and cyclic compounds comprising more than one ring. Troll does not disclose or suggest such compounds for the liquid composition. Claim 1 now recites in part (b)(iii) that the liquid composition is a combination comprising one or more of benzene or substituted benzene and at least one of an alkane or substituted alkane having a boiling point less than about 130 °C wherein the substituted benzene is substituted with one or more fluoro groups, fluoroalkyl groups or alkoxy groups. Troll does not disclose or suggest a liquid composition having the recited combination.

Claim 2 is directed to saturated cyclic compounds comprising two rings. Troll does not disclose or suggest such a feature for the fluid. The Office Action refers to col. 10, line 39, of Troll. However, the cited passage discloses 1-methylnaphthalene, which is an unsaturated compound not a saturated cyclic compound as required in Claim 2.

Claim 3 is directed to a device according to Claim 1 wherein said liquid composition is benzene substituted with one or more fluoro groups or substituted with one or more electron-donating groups attached directly to the ring and one or more fluoro groups attached to the ring or to the electron-donating groups wherein said electron-donating groups are selected from the group consisting of alkyl, alkoxy, hydroxy, and amino. Troll does not disclose or suggest such a liquid composition.

Furthermore, Troll's solid component comprises an optical switch and waveguides. Accordingly, as discussed above, by the very reasoning of the election of species, Troll, which is directed to a waveguide and optical switches, cannot anticipate Claims 1-6, where the species is a groove in a substrate, unless the election of species requirement is incorrect. If the election of species requirement is not discontinued, then claims to a device with a groove in a substrate are patentably distinct from the teaching of Troll's waveguide and optical system because of the rationale for the election of species.

For reasons similar to those discussed above, new Claims 75-94 are not disclosed or suggested by the disclosure of Troll.

#### Rejection under 35 U.S.C. §103

Claim 4 was rejected under paragraph (a) of the above code section as being unpatentable over Becker or Attridge or Troll.

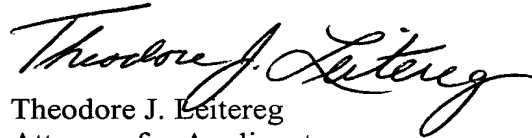
None of the references, either individually or in combination, discloses the liquid compositions of Claim 1 as discussed above. Accordingly, without acquiescing in the position of the Office Action that selection of the recited percent range is merely optimization, Claim 1, from which Claim 4 depends, is patentable over the above references. Consequently, Claim 4 is patentable over the above references by virtue of its dependency on Claim 1.

The above reasoning applies equally to new Claim 88.

Conclusion

Claims 1-6 and 75-94 satisfy the requirements of 35 U.S.C. §§102 and 103. Allowance of the above-identified patent application, it is submitted, is in order.

Respectfully submitted,



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